G   Modelling the effects of mutual recognition of imputation credits

Introducing the mutual recognition of imputation credits (MRIC) between Australia and New Zealand would have complex effects. Although conceptual analysis can be used to identify the relevant issues, the potential benefits and costs of MRIC depend on relativities which can only be apprehended through quantitative analysis. Prior to the release of the discussion draft, the ANZLF (sub. 58) provided modelling of MRIC. While this analysis has been helpful in illustrating the possible effects of MRIC, it was felt that there would be value in conducting further modelling to explore the mechanisms driving the results, the distributional impacts on national income, and the degree to which assumptions affect the results.

Accordingly, the Australian Commission designed the purpose-built SMRIC (Small Mutual Recognition of Imputation Credit) model to analyse the economic effects of introducing the mutual recognition of imputation credits (MRIC) between Australia and New Zealand.

Its main purpose is to investigate the effects of varying assumptions on the potential quantity, efficiency and inter-country distributional effects associated with MRIC. It is designed to be sufficiently simple and transparent for the drivers of the results to be clear and easily understood. This is done through a variety of illustrative simulations, examining a range of parameter values consistent with different views of the world.

The framework builds on a standard production model as described by McDougall (1960), representing the behaviour of factor supplies in three countries (Australia, New Zealand and the Rest of the World) and incorporating the relevant features of the Australian and New Zealand company and personal income tax systems. The model is designed to illustrate the potential allocative efficiency and distributional effects of unilateral recognition of imputation credits (Australia recognising New Zealand credits, and New Zealand recognising Australian credits), as well as the combined impact of an MRIC scenario.

Economic models are necessarily a stylised simplification of the real world. Results from the SMRIC model are not intended to provide the answers to the question of whether MRIC should be implemented or not. Rather, they give indicative illustrations of the likely sign and magnitude of policy impacts under a range of assumptions. Most importantly, the model provides insights into the mechanisms at work and the importance of relativities in data and responses.

This paper is divided into six sections. Section G.1 describes the structural properties of the SMRIC model, highlighting what the model does and does not include. Section G.2 contains an overview of the data used in the model. Section G.3 details the scenarios examined in this paper, and goes through an illustrative set of results for one combination of parameter values, highlighting the main mechanisms driving the model results for both unilateral policies, as well as the combined MRIC policy. Section G.4 describes the parameters varied in order to produce the ranges of results shown, and how each of those sensitivities will change the magnitude and distribution of the impacts. Section G.5 presents the model results for all of the parameter combinations examined. Section G.6 presents the conclusions based on the model results.

The key messages from the modelling are:

1. MRIC generates small allocative efficiency gains for Australia and New Zealand combined.

2. The fiscal cost of MRIC is necessarily larger for Australia than for New Zealand, because current Australian investment in New Zealand is much larger than the converse.

3. MRIC leads to income transfers between the two countries, whose size cannot be predicted because it depends on a range of parameters and underlying data for which there are varying estimates and which could be combined in many different ways.

4. SMRIC was used to run about a million simulations of different combinations of parameter and data values. Key results are:

    (a) When both countries gain (which happens in 12 percent of the simulations and requires markedly different investment responses in each country, both relative to the past and relative to each other moving forward), the impacts on each country are small.

    (b) The most common result (73 percent of the simulations) is that gross national income (GNI) increases in New Zealand but falls in Australia.

    (c) GNI increases in Australia and falls in New Zealand in 15 per cent of the simulations.

5. In general, increasing the benefits for one country increases the costs for the other.

G.1 A small model to analyse the effects of MRIC

The SMRIC model is designed to illustrate the potential static efficiency, welfare and tax revenue impacts of imputation credits on the Australian, New Zealand and trans-Tasman economies. It is based on the theoretical frameworks presented in McDougall (1960) and Sørensen and Johnson (2009). The model is detailed in appendix G.1. Its key features are:

- **Regions:** The model includes 3 regions: Australia, New Zealand and the Rest of the World. Regions are connected to each other by trade in goods and services, and movements of capital.

- **Production:** Each region produces a single output by combining factors of production using a constant elasticity of substitution (CES) technology. Elasticities can be easily varied to represent perfect complementarity between factors at one extreme, and perfectly substitutability between factors at the other – the degree of substitutability can be varied independently between different factors.

- **Factor demands:** The model includes two types of factor inputs: capital and specific factors. The returns paid to factors accrue to households in the owning region.

  – *Capital:* There are three types of capital in the model: Australian sourced, New Zealand sourced, Rest of the World sourced. Each of the three capital classes contains only those types of capital that will be impacted by imputation credit policies. Capital can be traded between regions.

  – *Specific factors:* Each region uses a specific factor in production that is assumed to be immobile, and so does not move between regions after MRIC is introduced, even if the relative returns to it in different regions change. This includes labour and land. These factors are assumed to be relatively difficult to substitute with capital (compared with the ability to substitute between different sources of capital).

- **Capital supplies:** capital from each region is allocated across regions according to a constant elasticity of substitution, such that regional suppliers of capital are not necessarily indifferent between sending capital to different locations. At one extreme, capital suppliers send capital to different regions

based purely on rate of return considerations. At the other, they send a fixed supply of capital to each region regardless of rate of return differentials. The degree to which suppliers switch between regions is not based solely on relative rates of return, and could be affected by a range of factors, including the degree of firms' access to global equity markets, differential regulatory arrangements in each region, and the portfolio diversification preferences of the capital owner.

- *Consumption:* Households in each region consume both domestic and imported goods and services subject to a budget constraint, based on a Cobb-Douglas utility function. Governments consume domestic and imported goods and services in the same proportions (domestic/imported) as households, subject to their tax revenue collections.

- *Taxes:* Three types of taxes are included in the model: taxes on personal income, corporate taxes, and consumption taxes. When imputation credits are granted to households through the personal income tax system, all factor incomes are effectively taxed at the personal income tax rate (if all credits are claimed).[1]

All values in the model are denominated in US$ 2010 to facilitate comparisons.

Allocative efficiency in the SMRIC model is measured through changes in real gross domestic product (GDP). While GDP measures output, it fails to account for all of the effects of implementing MRIC on the welfare of individuals. This is because, among other things, it abstracts from international movements in income, which contribute to determining the amount of goods and services that can be purchased and so affect economic welfare.

Welfare in the SMRIC model is measured through changes in real gross national income (GNI). GNI accounts for both the income received by households (including domestic factor income, as well as the incomes from their overseas assets) and income received through taxation revenue. Both private and public expenditures contribute to economic welfare (private expenditure through direct spending, and public expenditure through services such as hospitals and roads).

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1 The top marginal income tax rates (46.5 percent in Australia and 33 percent in New Zealand) are used in all calculations. Australian superannuation is taxed at a reduced rate of 15 percent. In the model, it was assumed that 20 percent of the investment from Australia into New Zealand was super funds.

Key behavioural parameters in the model

The model contains a number of parameters that influence behaviour.

1. The share of earnings distributed as dividends: Not all company earnings are distributed as dividends. Some are kept as retained earnings, and are instead capitalised into the price of the company. Retained earnings do not create dividends, and therefore will not create imputation credits.

2. The share of imputation credits claimed: Not all imputation credits are claimed. This could be for a range of reasons. For example, equity owners outside of Australia and New Zealand cannot make use of imputation credits; and some credits granted are — at the individual level — so small that the transaction cost of claiming them exceeds the expected benefit.

3. The supply responsiveness of capital: Suppliers of capital might be very willing to switch their capital between regions in response to changes in returns, or they might be relatively insensitive to changes in returns. A range of factors influences this. For example, some capital suppliers only care about relative returns and some might hedge their investments in one region with funds in another. Some might prefer investing in their home or similar countries for information reasons. Others still might prefer a fixed portfolio share in each region.

4. Capital demand substitutability: Firms might have varying degrees of ability to switch between the types of capital they use, purely from a demand perspective. On the one hand, purely financial capital might be relatively substitutable regardless of where it is sourced from. On the other, a particular investment (as measured in FDI) might benefit from knowledge associated with firm ownership/shareholder decision making sourced from a particular region.

A few comments on the model

The SMRIC model is comparative static and is used to analyse how (mutual) recognition of imputation credits affects the allocation of a given stock of resources (and community welfare, as measured by GNI) under a range of assumptions. A dynamic model would be required to analyse the potential effects of MRIC on the stock of capital through capital accumulation, by assessing how MRIC might affect savings and investment rates. That said, the complexity of a dynamic model would obscure the basic allocation mechanisms on which this work is focussed.[2]

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[2] In order to test the impact of increased capital accumulation, capital growth assumptions were examined as part of the sensitivity testing (section G.4).

The modelling presented in this paper is exploratory, designed to illustrate the ranges of allocative impacts as determined by different assumptions.

The SMRIC model abstracts from 'dynamic effects' such as increased competition, technological improvements or economies of scale that might be associated with the capital flows induced by MRIC. These effects are uncertain and would obscure the allocative effects on which this work is focussed. That said, they could be added in a dynamic model, although the usefulness of any results from such modelling would depend on assumptions made about how MRIC might, for example, lead to greater competition and business innovation.

The SMRIC model abstracts from more complex interactions associated with broader tax policy beyond personal income tax and company tax. In particular, the model abstracts from any interaction between imputation credits and other parts of the Australian and New Zealand tax systems. For example, there is a capital gains tax in Australia but not in New Zealand. To the extent that this interacts differentially with imputation credits and MRIC, these interactions are ignored. There are also likely to be differences in how taxable company income is calculated in each country, after allowing for differences in depreciation regimes and the like. Also, any means currently available to mitigate the effects of double-taxation (such as such as greater use of leverage (debt) to access interest deductions) are ignored. To the extent that these means are effective in avoiding the effects of the lack of recognition, results could overestimate the impacts of MRIC.

For the purposes of this paper, tax revenue lost through granting additional credits is not recovered through alternative forms of taxation. This is to avoid attributing any gains or losses that might be associated with implementing a replacement tax, which imposes a relatively low or high excess burden.

Different approaches — with different strengths and weaknesses — could be used to model the impact of imputation credit policies on the Australian and New Zealand economies. The Commissions held a technical workshop on 31 October 2012 to compare different approaches to modelling MRIC.[3] As a result of the workshop comments, the SMRIC model was updated to reflect participants' views about certain assumptions, including:

- greater foreign capital substitutability, such that when capital leaves Australia or New Zealand it can be 'back-filled' by relatively similar capital sourced from the rest of the world. As capital enters either economy from the trans-Tasman partner, it displaces relatively similar capital sourced from the rest of the world.

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[3] The workshop material is available at http://transtasman-review.pc.gov.au/.

- asymmetric responses by Australian and New Zealand investors, reflecting the different composition of existing stocks of Australian and New Zealand owned capital in the trans-Tasman partner. In particular, Australian-owned capital in New Zealand is largely FDI (which is less responsive to changes in post-tax returns) while New Zealand-owned capital in Australia is predominantly foreign portfolio investment (FPI, which is highly homogenous and price substitutable). FDI — associated with particular firms or investment projects — is comparatively less homogenous: individual projects can benefit from knowledge that goes with capital and majority shareholdings. FPI is driven almost completely by expected, risk-adjusted returns, because it is more homogenous. Both affect GDP and GNI similarly in national accounting, but the behavioural responses differ.

- capital growth projections, reflecting the fact that changes in MRIC could cause an increase in trans-Tasman savings (expanding the capital stock). Modelling presented by CIE (ANZLF, sub. 58) included capital accumulation (box G.1). In order to incorporate some measure of the potential effects of additional capital accumulation on the macro economic results for both economies, the CIE capital projections were incorporated into the model as part of the detailed scenario analysis.

G.2 Data and parameter assumptions

The model is parameterised primarily with national accounts and balance of payments data sourced from the ABS and SNZ; additional data were sourced from the ANZEA database.[4] Trans-Tasman foreign investment data were sourced from NZIER-CIE (2012) and SNZ. Tax revenues were calculated with tax rates sourced from the ATO and IRD.[5] The Australian and New Zealand macro data are closely related to official statistics. Bilateral incomes on foreign capital are based on

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4   The ANZEA database was developed in the context of the broader Strengthening trans-Tasman economic relations project. It is built from the publicly available GTAP database and bilateral capital ownership data available from CEPII. Further details are available from Supplementary Paper E. The GTAP database is a global database that supports a global model trade. The GTAP database consists of bilaterally consistent merchandise and services (mode 1) trade flows and consistent input-output tables from more than 100 countries. Version 7 database was used for this project; the original base year of 2004 was updated to 2010. Version 7 database is available at https://www.gtap.agecon.purdue.edu//

5   A possible alternative is to calibrate on tax revenues collected. That said, results are not affected substantially by this approximation.

shares derived from ANZEA, ABS and SNZ data. Data for the rest of the world are largely sourced from the ANZEA database.

The integration of data from a wide array of sources produces the database summarised in table G.1. All data are specified in US$ for the sake of comparison; values in A$ and NZ$ and sources are found in appendix G.2. The data show that in 2010:

- around 75 percent of New Zealand's foreign capital income was earned in Australia; 18 percent of Australia's foreign capital income was earned in New Zealand[6,7]

- New Zealand capital owners accounted for 8 percent of foreign corporate capital income generated in Australia; Australian capital owners accounted for 58 percent of foreign corporate capital income generated in New Zealand

- For both Australia and New Zealand, capital incomes sent overseas exceeded capital incomes received from overseas.

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[6] Capital income in this sense is income subject to corporate tax. It excludes some forms of capital income such as that associated with unincorporated enterprises.

[7] These data are provided by SNZ. There is significant variation between these data and those published by the ABS.

Table **G.1**   **Basic macroeconomic relationships**
2010 US$m

	Australia	New Zealand	Rest of the World
Balance of Payments[a]			
Exports	252 948	37 221	257 713
Imports	239 405	35 280	273 197
Trade balance	**13 543**	**1 941**	**-15 484**
Corporate capital income received from o/seas (pre-tax)	20 771	4 078	38 189
Corporate capital income paid to o/seas owners (pre-tax)	-38 277	-7 185	-17 576
Revenue from company tax on foreign capital	8 833	1 572	1 598
Company tax paid o/seas	-2 424	-802	-8 777
Net debt, net remittances, net investment flows[b]	-2 446	395	2 051
Total balance of payments	**-13 543**	**-1 941**	**15 484**
Income and expenditure			
Labour, land income, other taxes and non-corporate capital income	1 023 366	113 743	66 103 272
Domestic corporate capital income	143 468	12 411	10 595 672
Foreign corporate capital income (trans-Tasman)[c]	3 274	2 371	
Foreign corporate capital income (other)[d]	15 073	906	29 412
Revenue from company tax on foreign capital	8 833	1 572	1 598
Net debt, net remittances, net investment flows[b]	-2 446	395	2 051
Gross National Income	**1 191 568**	**131 398**	**76 732 004**
Consumption of domestic production	952 163	96 118	76 458 807
Consumption of imports	239 405	35 280	273 197
Gross National Expenditure	**1 191 568**	**131 398**	**76 732 004**
Gross domestic product (GDP)[a]			
Consumption, Investment, Government spending	1 191 568	131 398	76 732 004
Exports	252 948	37 221	257 713
Imports	239 405	35 280	273 197
GDP (Expenditure side)	**1 205 111**	**133 339**	**76 716 520**
Specific factor income (including taxes)	1 023 366	113 743	66 103 272
Corporate capital income (including taxes)	181 745	19 596	10 613 248
GDP (Income side)	**1 205 111**	**133 339**	**76 716 520**

a Balance of payments and trade figures in the Rest of the World column refer to payments and flows between the Rest of the World and Australia and New Zealand. **b** This item used as a balancing item and therefore does not correspond to official data. It aggregates items from the income and capital accounts. **c** Trans-Tasman foreign capital income refers to foreign capital income that is earned in one trans-Tasman country and accrues to the other trans-Tasman country. **d** This represents gross income after tax received as capital income from overseas. Payments to overseas equity and debt are accounted for in the balance of payments as capital income paid to o/seas owners (pre-tax).

Sources: Detailed in Appendix G.2.

G.3 Scenarios and results

MRIC aims to improve price signals and efficiency in trans-Tasman investment by removing double taxation of distributed earnings. At present, domestic owners of capital in Australia and New Zealand receive a personal income tax credit for company tax already paid on capital incomes they receive domestically, but not for capital incomes received from overseas investments. This creates a distortion away from investment overseas (including trans-Tasman investment) in favour of domestic investment. Recognition of imputation credits means that all domestic factors employed within an economy face the same taxation — the income tax rate (abstracting from other complications introduced by the broader tax system).

Mutual recognition of imputation credits is the combination of two policies — Australian recognition of New Zealand imputation credits and New Zealand recognition of Australian imputation credits. Given the relative shares of foreign capital in each economy, differences between Australia and New Zealand in the shares of trans-Tasman capital in total foreign capital, and the disparate tax rates, the efficiency, welfare, and transfer implications in each economy of MRIC are likely to differ.

To provide a better understanding of the effects of MRIC, the analysis considers three cases:

1. Australian recognition of New Zealand imputation credits

2. New Zealand recognition of Australian imputation credits

3. Mutual recognition of trans-Tasman imputation credits.

The recognition of imputation credits is modelled as an income tax credit in the source country.[8] In terms of accounting, the income tax credit forms part of the capital owners' pre-tax income, and then personal income tax is deducted from the total. This ensures that imputation credits are accurately reflected in the total tax revenue impacts on government without being overstated. The after-tax increase in income accruing to the owner of trans-Tasman capital is financed by a reduction in tax revenues in the capital-source country.

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8 In this paper the source country refers to the country from which the capital is sourced, that is, the country of residence of the owner of the capital. The destination country refers to the country in which the stock of productive capital is located. Thus part of the capital income generated as GDP in the destination country is repatriated to the source country as part of its GNI.

Illustrative results for one parameter set

Illustrative results for one set of parameters are detailed in this section to highlight the key drivers and transmission mechanisms that underpin the model results. The results are not predictions, but can be used to illustrate key relationships. The three simulations are detailed in this section: Australian recognition of New Zealand credits; New Zealand recognition of Australian credits; and mutual recognition of trans-Tasman credits.

Australian recognition of New Zealand imputation credits

Abstracting from any price or quantity responses, when the chosen set of parameters is modelled, Australian recognition of New Zealand imputation credits causes the Australian government to recognise $250 million worth of taxes paid in New Zealand. This accrues to owners of Australian capital that is located in New Zealand, in the form of increased post-tax returns. As part of this 'first round' effect, there are no changes in investment or capital stock, national outputs and incomes remain fixed for both countries in aggregate, and there is a simple transfer from Australian taxpayers to Australian owners of capital in New Zealand.

Behavioural responses complicate this story; these effects are reported in table G.2. The increase in post-tax returns to Australian capital located in New Zealand causes Australian capital owners to reallocate their supply of capital toward New Zealand and away from Australia and the rest of the world. This increased supply decreases the marginal productivity of capital and its returns in New Zealand, following the decreasing marginal product of capital schedule. The Australian-owned capital stock in New Zealand increases by US$163 million (sourced from both Australian capital used domestically, and Australian capital used in the Rest of the World). The total stock of capital in New Zealand expands by US$97 million, with US$66 million worth of New Zealand and Rest of the World capital in New Zealand heading to other countries as a result of the influx of Australian capital. The capital stock used in Australia contracts by US$41 million (the large movement of capital from Australia to New Zealand is partially offset by backfilling of relatively substitutable Rest of the World capital). The total trans-Tasman imputation credits recognised after incorporating behavioural responses is US$263 million.

Australia's domestically-sourced capital contraction is partially offset by an inflow of capital from overseas. The marginal rate of return on Australian capital increases because the capital stock is smaller. This causes Australian firms to substitute away from domestically sourced capital, and towards Rest of the World

capital. The net effect is an increase in capital demanded from the rest of the rest of the world by Australia, by US$42 million.

Table G.2 **Impacts of Australian recognition of New Zealand imputation credits[a,b]**

Change US$m, 2012

	Trans-Tasman	Australia	New Zealand
Specific factor income accruing to households after tax[c]	33	-72	105
Returns to domestically owned and used capital accruing to households after tax	32	-42	74
Imputation credits granted for foreign capital taxes	263	263	0
Returns to domestically owned capital used overseas accruing to households after tax	-33	-32	0
used in Australia	1	na	1
used in New Zealand	-19	-19	na
used in the Rest of the World	-14	-13	-1
Taxes on personal income	**-264**	**-353**	**88**
Total tax collected on personal income	-32	-120	88
imputation credits granted for domestic company tax	31	31	0
imputation credits granted for foreign company tax	-263	-263	0
Company taxes levied on capital used domestically	**-1**	**-18**	**17**
Australian owned	9	-31	40
New Zealand owned	-3	-3	0
Rest of the World owned	-8	16	-23
Gross National Income[d]	30	-254	284
Gross Domestic Product	24	-139	163

a The elasticity of substitution between specific factors and capital is assumed to be 0.85. The elasticity of substitution between capital from different sources is set to 10. **b** The results contained in this table are a reproduction of components of more detailed national accounting results presented in appendix G.3. **c** Region-specific inputs are assumed to be in fixed supply. **d** Gross National Income (GNI) is the sum of the bolded values in the table.

Source: Australian Commission estimates.

The shift in capital from Australia to New Zealand has several effects.

1. The post-tax returns to Australian-owners of New Zealand capital increase. The consequent increase in supply of Australian capital to New Zealand and decrease in marginal productivity moderates the increase. Australian capital is attracted to New Zealand by the higher post-tax returns available there, and this continues until post-tax returns have once again been equalised between the two countries. The net impact on post-tax payments to Australian-owned capital after recognition of the imputation credits is US$231 million (US$263 million less US$32 million).

2. Returns to specific factors in New Zealand increase. With the inflow of Australian capital, the New Zealand economy expands. With this expansion,

New Zealand firms increase their demand for specific factors. Since the specific factor in each country is assumed to be fixed, the payments it receives increases. In practice, this could manifest as either an increased return to the specific factor in New Zealand, or an increased utilisation of unemployed factors (such as a decrease in the rate of unemployment). The net increase in payments to the New Zealand specific factor in this simulation is US$105 million.

3. Returns to the specific factor in Australia decrease. As the stock of capital in Australia contracts, firms decrease their demand for non-capital factors. Since specific factors are assumed to be in fixed supply, the marginal product of the fixed factor decreases, and so do the payments it receives. (All units of the fixed factor are assumed to be paid the marginal product.) This decreases the net payments to Australian specific factors by US$72 million.

4. The increased value of Australian-owned capital stock in New Zealand increases New Zealand company tax revenue from that capital (US$40 million). However, this is offset by a loss in company tax revenue on departing Rest of the World capital (US$23 million).[9] Australian company tax revenues from domestically owned capital decrease (US$31 million) as capital from Australia moves to more productive and higher return use in New Zealand. This is partially offset by increased company tax on capital inflows from the Rest of the World (US$16 million).

5. The increased level of specific factor income in the New Zealand economy increases New Zealand revenue from income tax. The decrease in payments to Australian specific factors further reduces Australian income tax revenue. The net increase in New Zealand tax revenue is US$105 million (US$88 million plus US$17 million), and the net decrease in Australian tax revenue is US$370 million.

The net impacts of these responses are:

• an expansion in New Zealand GDP. The increased rate of return to Australian capital owners causes a movement of capital away from Australia and into New Zealand, which has a larger impact on New Zealand's GDP than that of the departing rest of the world capital.

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9 Some Rest of the World capital is lost from New Zealand due to the inflow of Australian capital. The increased supply of Australian capital — which is relatively highly substitutable with other capital — drives down the market rate of return. This causes some Rest of the World capital to leave New Zealand to the more favourable returns elsewhere (some relocates to Australia as part of capital back-filling).

- an expansion in New Zealand GNI. If the capital stock could not relocate, Australian recognition of imputation credits would result in a one-for-one transfer from the Australian government to capital owners (with no impact on Australia's GNI or GDP). However, when capital is able to relocate, the increased investment in New Zealand increases the marginal product of New Zealand's specific factors (including labour), which increases the pre-tax incomes paid to owners of those factors. The increase in post-tax incomes then accrues to New Zealand owners of specific factors (as GDP expands), and the New Zealand government (as additional tax is collected on the increased inflow of Australian capital, and on the increased New Zealand specific factor income). These two factors drive the increase in New Zealand GNI.

- a net contraction in Australian GNI and GDP. While returns to owners of Australian capital in New Zealand increase, this is offset by larger reductions in tax revenue and payments to the specific factors

- a small increase in trans-Tasman GDP and GNI. The overall GNI expansion of US$30 million is about 11 per cent of the size of the gains that accrue to New Zealand.

New Zealand recognition of Australian imputation credits

The drivers of the results for New Zealand's recognition of Australian imputation credits are the same as those identified above, when Australia recognises New Zealand imputation credits. The effects are smaller because New Zealand capital plays a smaller role in the Australian economy: foreign capital in Australia comes mainly from the Rest of the World. Thus, additional capital from New Zealand does not decrease Australian costs of production by much. The value of Australian imputation credits recognised in New Zealand would be US$163 million before incorporating behavioural responses, and US$171 million after.

Increased returns to New Zealand-owned capital in Australia increase Australia's capital stock by US$46 million, and decrease New Zealand's capital stock by US$34 million.

The net movement of capital toward Australia causes (table G.3):

1. A net increase in post-tax payments to New Zealand-owned Australian capital of US$141 million (US$171 million less US$30 million)

2. A net increase in payments to Australian specific factors of US$56 million.

3. A net decrease in payments to New Zealand specific factors of US$60 million.

4. A net increase in Australian tax revenue of US$86 million (US$72 million plus US$13 million)

5. A net decrease in New Zealand tax revenue of US$219 million (US$207 million plus US$13 million).

New Zealand's recognition of Australian imputation credits produces a transfer of income of around US$166 million from New Zealand to Australia. From a trans-Tasman perspective, there is a US$14 million increase in income. Trans-Tasman GDP increases by US$13 million.

Table G.3 **Impacts of New Zealand recognition of Australian imputation credits[a,b]**

Change US$m, 2012

	Trans-Tasman	Australia	New Zealand
Specific factor income accruing to households after tax[c]	**-3**	**56**	**-60**
Returns to domestically owned and used capital accruing to households after tax	**30**	**58**	**-28**
Imputation credits granted for foreign capital taxes	**171**	**0**	**171**
Returns to domestically owned capital used overseas accruing to households after tax	**-49**	**-20**	**-30**
used in Australia	-30	na	-30
used in New Zealand	-8	-8	na
used in the Rest of the World	-11	-11	0
Taxes on personal income	**-134**	**72**	**-207**
Total tax collected on personal income	19	77	-58
imputation credits granted for domestic company tax	17	-5	22
imputation credits granted for foreign company tax	-171	0	-171
Company taxes levied on foreign used domestically	**1**	**13**	**-13**
Australian owned	2	5	-2
New Zealand owned	6	28	-22
Rest of the World owned	-7	-19	12
Gross National Income[d]	14	180	-166
Gross Domestic Product	13	106	-93

a The elasticity of substitution between specific factors and capital is assumed to be 0.85. The elasticity of substitution between capital from different sources is set to 10. **b** The results contained in this table are a reproduction of components of more detailed national accounting results presented in Appendix G.3. **c** Region-specific inputs are assumed to be in fixed supply. **d** Gross National Income (GNI) is the sum of the bolded values in the table.

Source: Australian Commission estimates.

Mutual recognition of imputation credits

Table G.4 **Impacts of mutual recognition of trans-Tasman imputation credits[a,b]**

Change US$m, 2012

	Trans-Tasman	Australia	New Zealand
Specific factor income accruing to households after tax[c]	**30**	**-16**	**46**
Returns to domestically owned and used capital accruing to households after tax	**62**	**15**	**46**
Imputation credits granted for foreign capital taxes	**432**	**262**	**170**
Returns to domestically owned capital used overseas accruing to households after tax	**-81**	**-52**	**-30**
used in Australia	-29	na	-29
used in New Zealand	-27	-27	na
used in the Rest of the World	-25	-25	-1
Taxes on personal income	**-396**	**-279**	**-117**
Total tax collected on personal income	-12	-43	31
imputation credits granted for domestic company tax	47	26	21
imputation credits granted for foreign company tax	-432	-262	-170
Company taxes levied on capital used domestically	**0**	**-5**	**4**
Australian owned	12	-26	38
New Zealand owned	3	24	-21
Rest of the World owned	-15	-3	-12
Gross National Income[d]	46	-74	120
Gross Domestic Product	38	-33	71

a The elasticity of substitution between specific factors and capital is assumed to be 0.85. The elasticity of substitution between capital from different sources is set to 10. **b** The results contained in this table are a reproduction of components of more detailed national accounting results presented in Appendix G.3. **c** Region-specific inputs are assumed to be in fixed supply. **d** Gross National Income (GNI) is the sum of the bolded values in the table.

Source: Australian Commission estimates.

The MRIC results very closely match the sum of both RIC results (table G.4). With MRIC, the effects of Australian recognition of New Zealand imputation credits dominate, due to the size of the initial capital stocks, the relative sizes of the two economies, and the behavioural responses. There is a net transfer of income from Australia to New Zealand (Australian GNI contracts by US$74 million, and New Zealand GNI increases by US$120 million) and trans-Tasman output increases (by US$38 million).

The impacts of MRIC between Australia and New Zealand are:

- a net increase in capital in New Zealand of US$195 million, and a net contraction of capital in Australia of US$47 million

- a net increase in returns to Australian- and New Zealand-owned overseas capital of US$211 million (US$262 million less US$52 million) and US$140 million (US$170 million less US$30 million) respectively

- a net increase in payments to New Zealand specific factors of US$46 million, and a net decrease of payments to Australian specific factors of US$16 million

- a net decrease in Australian and New Zealand tax revenue of US$284 million (US$279 million plus US$5 million) and US$113 million (US$117 million less US$4 million) respectively.

G.4 Sensitivities examined

The SMRIC model was developed to examine whether any general conclusions can be drawn, given the large amount of uncertainty surrounding key data (such as trans-Tasman capital stocks) and parameter values. In order to do this, the model was used to analyse more than one million plausible parameter combinations, varying them simultaneously.[10]

If no bounds were placed on uncertain parameters an even larger number of simulations would have been required. To limit the number of simulations, the Commission sought advice about plausible values and ranges for variables. The sensitivity ranges examined for this analysis, as well as the point values used for the illustrative scenario in section G.3, are detailed in table G.5. Given that there is a plausible range of values for each variable, and that these values could conceivably be combined in many different ways, a very large number of combinations is conceivable even when ranges are limited.

For the purposes of the sensitivity analyses detailed later in this paper, Australian and New Zealand parameters were allowed to vary separately (to allow the impacts of economic asymmetries between the two countries to be explored in the analysis). With the exception of the supply responsiveness of capital to changes in rates of return, parameters were assumed to be uncorrelated. The capital supply from Australia was set to be less responsive for Australia than for New Zealand, reflecting the greater share of Australian FDI in New Zealand (and assumed greater access to global equity markets) and the greater share of FPI in New Zealand investment. FDI, being connected to specific projects and firms, is not

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[10] One million parameter combinations were examined to produce the results contained in this paper, based on random sampling of the distributions detailed in table G.2. The results presented do not represent probability distributions of results. If probability distributions of input parameters were known, the model could be used to produce distributions of results with attached probabilities.

perfectly homogenous. FPI on the other hand, is differentiated purely by risk-adjusted rates of return, and is therefore highly substitutable.

Table G.5 **Parameters and data used to construct ranges of model results**
US$ 2010

	Lower bound	*Upper bound*	*Illustrative scenario*
Share of earnings distributed as dividends[a]			
Australia	0.3	0.8	0.5
New Zealand	0.3	0.8	0.5
Share of dividend credits claimed[a]			
Australia	0.3	0.8	0.5
New Zealand	0.3	0.8	0.5
Supply responsiveness of capital[b]			
Australia	1.0	4.0	2.5
New Zealand	2.0	8.0	5.0
Capital demand substitutability			
Australia	0.85	10	10
New Zealand	0.85	10	10
Capital incomes			
Value of taxable Australian capital incomes in New Zealand	3 802[d]	4 191[c]	4 191
Value of taxable New Zealand capital incomes in Australia	1 102[d]	2 382[c]	2 382
Average annual capital growth above base[e]			
Australia	0.0	2.0	0.0
New Zealand	0.0	3.5	0.0

[a] Both of these components (having a uniform distribution) were combined in a triangular distribution such that there was a 95 percent chance of the combined value being between 0.2 and 0.3. The NZ PC value was 0.3. [b] A value of zero would represent 100 percent access to international equity, a value of infinity would represent zero access. Values in excess of 6 roughly converge to infinity. The Australian value was always assumed to be twice the New Zealand value. [c] Statistics New Zealand unpublished data. [d] Australian Bureau of Statistics. [e] Lower bounds assumed zero capital growth induced above base by the MRIC policy, given the very small impacts on the price of savings relative to consumption. Upper bounds were defined as the upper-bound deviation in investment from the baseline the forecast from the CIE simulations, rounding up to the nearest half decimal point.

The sign, magnitude, and distribution of the welfare and allocative efficiency impacts are affected differently by each of the parameter sensitivities examined.

Dividend parameters

The model contains two parameters related specifically to dividends that can influence the magnitude and distribution of impacts:

1. The proportion of total corporate earnings distributed as dividends: imputation credits affect investment in the destination country only if the credits received change the post-tax return for capital owners. If no earnings were to be distributed as dividends, no credits will be granted, and an imputation credit policy will have no effect.

2. The proportion of total credits claimed: if credits go unclaimed, there will be no impact from an imputation credit policy. For example, some shareholders are unable to claim credits granted (that is, if they reside outside Australia/New Zealand).

There is little data about the size of these parameters. Based on feedback at the Commissions' workshop, they were both assumed to take values between 0.3 and 0.7 for both Australia and New Zealand. The combined impact of the two parameters is such that the total share of distributed earnings that results in a credit that is then claimed, is triangularly distributed, with 95 percent of values between 0.2 and 0.3.[11]

Reducing the earnings distributed in the capital-destination country, or the proportion of dividends claimed in the capital-source country, reduces the costs associated with any given RIC policy for the source country, and decreases the benefits for the destination country by:

- reducing the share of total capital impacted by the policy, which limits the fiscal cost of providing credits on existing, inframarginal capital

- reducing the marginal response, which limits the economy-wide allocative efficiency benefits accruing to the trans-Tasman economies.

Capital demand substitutability

Capital demand substitutability plays a role in influencing how readily an economy can switch between different types of capital used to produce output. At the

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[11] The addition of two uniformly distributed parameters creates a triangularly distributed variable, scaled to reflect the two uniformly distributed terms. This assumption was made to encompass reasonable bounds on the combined impact of the two parameters, based on comments at the workshop. For example, if both parameters separately took a value of 0.3 without a joint distribution, only 9 percent of earnings would be distributed and claimed.

workshop, it was felt that capital back-filling (that is, capital from the rest of the world replacing domestic capital moving to the trans-Tasman partner) would play an important role in limiting the GDP contraction resulting after capital is shed from an imputation credit recognising economy. It would also influence the degree of capital displacement in the destination economy, and the magnitude of trans-Tasman capital movement overall (and hence tax revenue cost for the recognising government).

This parameter was assumed to vary between 0.85 (relatively low substitutability between capital sources, reflecting a degree of complementarity between Australian, New Zealand and Rest of the World capital) and 10 (near perfect substitutability) with a uniform distribution. This was based around the idea of having a value centred on commonly used values[12], that provided a large amount of capital substitutability in a majority of parameter combinations examined. Given the uniform distribution, and that substitution elasticities in excess of 7 indicate high substitutability, a large proportion of the parameter combinations imply highly substitutable capital.

When capital from different countries is highly substitutable, MRIC induces large movements in capital, but little change in the total amount of capital in the destination country. This results in small changes in GDP, but relatively large changes in GNI with the large changes in ownership:

1. When capital demand is highly substitutable, unilateral recognition of imputation credits has small impacts on GDP. In the country that recognises the foreign imputation credits, high capital substitution in production will result in a large amount of foreign capital replacement of the capital that moves across the Tasman. As domestic capital is shed, the capital to specific factor ratio falls, increasing the marginal product of capital. This will attract capital from the rest of the world, and limit the relative reduction in returns to the specific factor. Similarly, in the country receiving the trans-Tasman capital flow, high capital substitution will cause the incoming capital to displace a large amount of foreign capital.

2. GNI is impacted by changes in factor income payments and tax collections, and high substitutability of capital in production exacerbates the effects on GNI. Granting imputation credits in one country will cause the movement of capital to the other country to be larger than it would have been with a lower elasticity. Relatively small decreases in the price of capital will induce large

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[12] For example, typical CGE models — such as the GTAP model — assume a substitution elasticity between capital sources of 5.

increases in the quantity demanded. This will cause a larger marginal shift in capital stocks, increasing the tax revenue cost to the recognising government.

Capital supply substitutability

The supply elasticity of capital with respect to the post-tax rate of return influences the degree to which an economy will respond to an imputation credit recognition policy. A low value will limit the extent to which suppliers of capital will be willing to expand their capital supplies in the destination region in response to an increase in the rates of return.

This parameter was assigned a value between 1 and 4 for Australia, and 2 and 8 for New Zealand, with uniform distributions. The New Zealand parameter was assumed to be double the Australian parameter to reflect the relatively larger share of portfolio investment from New Zealand to Australia, which is assumed to be more responsive to changes in returns than FDI.

Lower values of the capital supply elasticity will reduce the costs associated with any particular RIC policy, and limit the benefits to the destination country. A lower capital supply elasticity means that a greater increase in the post-tax rate of return is required to induce a shift in capital supply from the source country to the destination country. This will limit the economic contraction in the source country, and decrease the magnitude of the increase in imputation credit costs resulting from marginal increases in capital moving to the trans-Tasman partner.

Trans-Tasman capital stocks and capital income

The amount of trans-Tasman capital in Australia and New Zealand influences the inframarginal cost of imputation credit recognition (as credits are provided on existing capital). When a government recognises trans-Tasman imputation credits, it must provide credits on the entirety of the capital stock in the trans-Tasman partner, not just the changes at the margin. In the model, the stock of capital also affects the degree of capital expansion at the margin (for a given level of capital supply and demand elasticity).

The available data in this area are inconsistent across sources (for example, the ABS and NZStats data are not the same, table G.5). The Commission tested the effect of different assumptions about capital stock, equity level, and capital income values.

While the data for the value of Australia's capital stocks in New Zealand are relatively consistent across sources, data for capital stocks in New Zealand are more uncertain. Higher levels of Australian-sourced capital in New Zealand improve MRIC outcomes for Australia, and worsen MRIC outcomes for New Zealand. This is because initial levels of capital govern the first round imputation credit cost (prior to behavioural response) as well as the induced supply and demand responses (abstracting from asymmetric effects resulting from other parameters). Larger New Zealand-owned capital stocks in Australia translate into larger tax revenue costs for New Zealand, and larger flows of capital from New Zealand to Australia as a result of the recognition of Australian franking credits in New Zealand.

Capital accumulation

The standard model detailed in this paper assumes the stocks of capital owned by each country remain fixed at initial levels. This assumption is made deliberately to abstract from the dynamic accumulation of capital, which obscures the drivers of allocative efficiency gains. It is also assumed that the relatively small changes in the relative return to capital (relative to the price of consumption) would have very little impact on inducing higher savings than the base case.

Participants at the workshop suggested that the omission of capital accumulation could understate the impacts of MRIC on GDP. The model used by the CIE (ANZLF, sub. 58), which was discussed at the workshop, includes capital accumulation through recursive comparative statics. For this reason, as part of the sensitivity analysis, the CIE results for trans-Tasman investment were used in SMRIC sensitivities as an upper-bound of the induced savings resulting from imputation credit recognition policies.

Capital accumulation through increases in the rate of savings (at the expense of consumption) increase trans-Tasman, Australian, and New Zealand GDP. Higher levels of trans-Tasman owned capital increase productive capacity and income. However, the impact of RIC policies on GNI for different capital growth assumptions are ambiguous, and related to other input parameters (specifically, capital demand and supply elasticities).

1. To the extent that new capital flows to the trans-Tasman partner, granting imputation credits in conjunction with capital accumulation increases the cost of a RIC policy, by further reducing tax revenues. This is only partially offset in GNI by increased post tax returns to domestic owners of capital (after induced price responses). Some of the increased returns resulting from the expansion

in the capital stock accrue to the owners of complimentary factors in the destination country.

2. If newly created capital remains at home, it creates unambiguous gains for the country. This can occur if either the capital demand elasticity is low in the destination region, or if the capital supply response is low in the home region. In this case, newly accumulated capital can more than replace capital lost to the trans-Tasman partner.

Higher capital accumulation unambiguously increase trans-Tasman GDP and GNI.

G.5 Sensitivity of results

Figure G.1 shows the ranges for GDP, GNI and net tax revenue impact for Australia, New Zealand and the trans-Tasman as a whole for all the parameter combinations (presented in table G.5) examined in this paper. Figure G.1 shows the large ranges of results, reflecting the high degree of uncertainty in data and parameters.

Figure G.1   **Real impacts of changes in all parameters[a,b]**
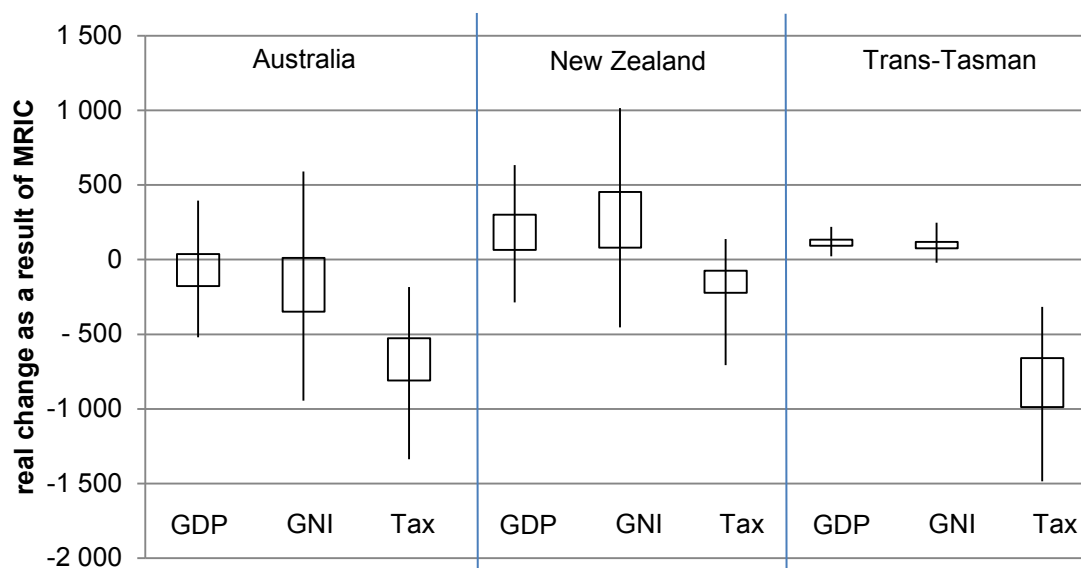
a All parameters are varied simultaneously and separately. All parameters are assumed to be uncorrelated except the capital supply elasticity (where the Australian value is assumed to be half the New Zealand value). **b** The box plots show the ranges in which the results for the 1,000,000 parameter combinations fell. The boxed regions show the central 50 per cent of results (ie the 25th and 75th percentiles), while the tails show the minimum and maximum values. Results in the figure cannot be interpreted as coming from the same simulation: for example, it is impossible to obtain both the maximum Australian and New Zealand GDP values, regardless of parameter combinations.

Data source: Australian Commission estimates.

The results indicate that there are unambiguous trans-Tasman allocative efficiency gains (as measured through trans-Tasman GDP) as a result of an MRIC policy. Capital moves to where marginal product is highest.

The trans-Tasman static efficiency gains are relatively small when compared to the results for Australia and New Zealand individually. In a majority of the parameter combinations examined, the policy results in a net increase in GDP and GNI for New Zealand, and a net decrease in GDP and GNI for Australia. The GDP effect is, in general, smaller than the GNI effect, due to foreign capital back-filling/displacement — that is, capital from the rest of the world replaces (displaces) capital that is sent to (received from) the trans-Tasman partner, but the additional (reduced) incomes associated with these policies accrue to the rest of the world.

The asymmetric GNI results for Australia and New Zealand are driven, to a large extent, by differences in the sizes of capital stocks in the two countries, and their capital responses. A situation in which both countries' GDP and GNI increase can only be achieved if the costs that Australia incurs by recognising New Zealand credits are more than offset by the benefits resulting from New Zealand recognising Australian credits (box G.1). Given the initial asymmetries in investment data, this requires a fine balance of differential responses: for example, a limited capital supply response from Australia or markedly lower rates of earnings distributed as dividends in New Zealand than in Australia. However, if the response is too strong, the balance can be reversed, such that New Zealand GNI decreases, and Australian GNI increases.

Box G.1   Mutual recognition and parameter combinations

Mutual recognition of trans-Tasman imputation credits is the combination of two policies: Australian recognition of corporate tax paid in New Zealand; and New Zealand recognition of corporate tax paid in Australia. Each of these unilateral recognition policies reduces GNI in the recognising country, and increases GNI in the destination country. Combining the two unilateral policies (that is, implementing a mutual recognition policy) can produce a net increase in both countries' combined GNI, provided that the gains from one offset the costs for the other.

GNI can increase in both countries simultaneously when there are certain combinations of parameters and data. However, there are many parameters required to achieve this balance of costs and benefits. Initial levels of data, behavioural responses, and tax rates all impact on the distribution of costs and benefits to both Australia and New Zealand as a result of imputation credit recognition policies. For example, if dividend distribution rates in New Zealand were lower, or Australia's capital supply response to New Zealand is assumed to be small relative to the New Zealand response, the costs to Australia of recognising New Zealand credits is smaller and it is possible for MRIC to produce gains in GNI for each country. However, limiting the Australian investment response also has an impact on New Zealand's GNI, and lowering it too much could result in a net loss to New Zealand.

The balance required for GNI to increase in both countries can be illustrated by the following experiment: Australia's capital supply elasticity New Zealand is varied while retaining all other parameters from the illustrative combination used in section G.3. The lower the supply elasticity the smaller the cost to Australia of recognising New Zealand credits: the induced response in capital supply is reduced, meaning that more capital stays in Australia. However, the smaller the capital movement, the smaller the benefit that accrues to New Zealand. There is a narrow range for Australia's supply elasticity where both Australia and New Zealand experience net GNI gains as a result of MRIC (shown as the shaded area).
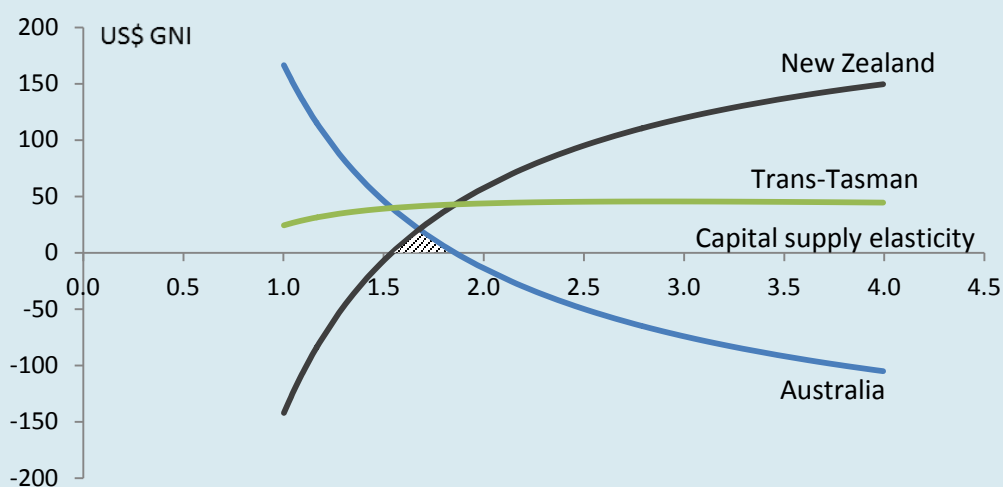
Source: Australian Commission estimates.

Given the relatively large amount of capital that Australia has in New Zealand, the tax revenue cost of MRIC is almost invariably larger for Australia than it is for New Zealand. For some parameter combinations, there can be a net increase in tax revenue for New Zealand: the increase in revenues from personal taxation (as economic activity expands) and increased corporate tax collections on incoming capital is sufficient to offset the tax cost of the imputation credits granted.

The results indicate that there is a relationship between the gains accruing to one country and the cost imposed on the other as a result of MRIC (figure G.2) — that is, larger increases in GDP/GNI for one partner are associated with larger reductions in GDP/GNI for the other, the sum of which is the effect of MRIC on the trans-Tasman economy as a whole. While there are parameter combinations that would lead to large increases in GDP or GNI for either country, this only happens where there are large losses for the other country. Based on the parameter combinations examined, the costs and benefits imposed on Australia and New Zealand individually are considerably larger than the small trans-Tasman allocative efficiency gains, which can be calculated by adding the gains and losses for each country.

Figure G.2 also shows that results from the SMRIC model are consistent with the CIE's results (box G.2) when the two models use similar input assumptions.

The asymmetric effects on Australia and New Zealand suggested by these results are consistent with intuition, given that the starting point is that Australian investment in New Zealand is larger than the converse. Australia can gain if it limits income transfers to New Zealand by limiting its investment response. Australia can then gain from the greater capital inflow from New Zealand. But of course, reducing Australia's investment response (and corresponding losses) also reduces the potential gains of MRIC to New Zealand. Allocative efficiency gains arise as a result of movement in trans-Tasman capital, and to the extent that trans-Tasman capital movement is reduced, so too are the trans-Tasman allocative efficiency gains that can accrue to Australia and New Zealand. In other words, achieving gains for both countries requires a very fine balance.

Figure G.2   Effects of MRIC on Australian and New Zealand GDP and GNI[a,b]

Australian and New Zealand GDP for all parameter combinations examined
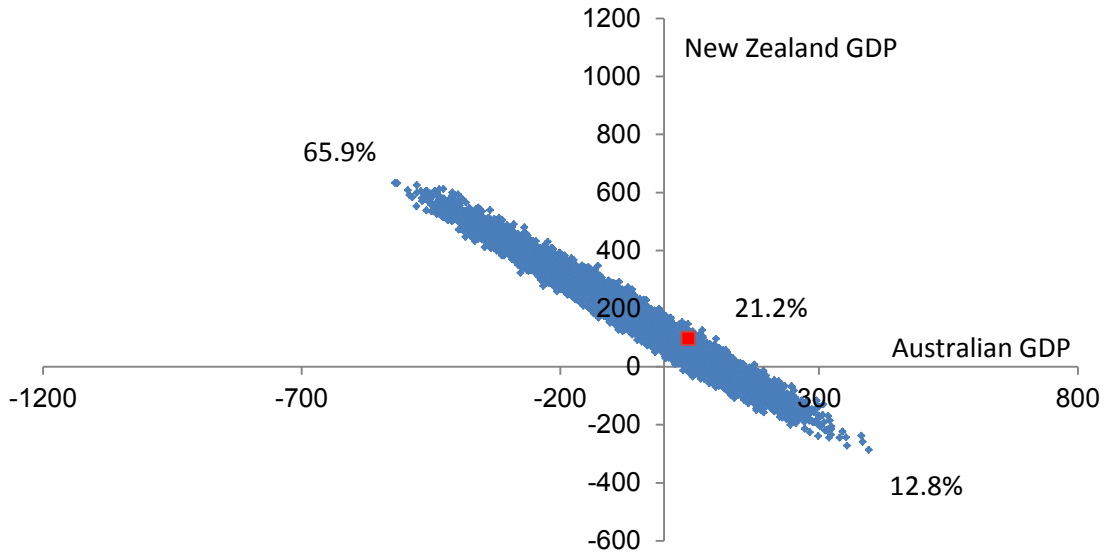
Australian and New Zealand GNI for all parameter combinations examined
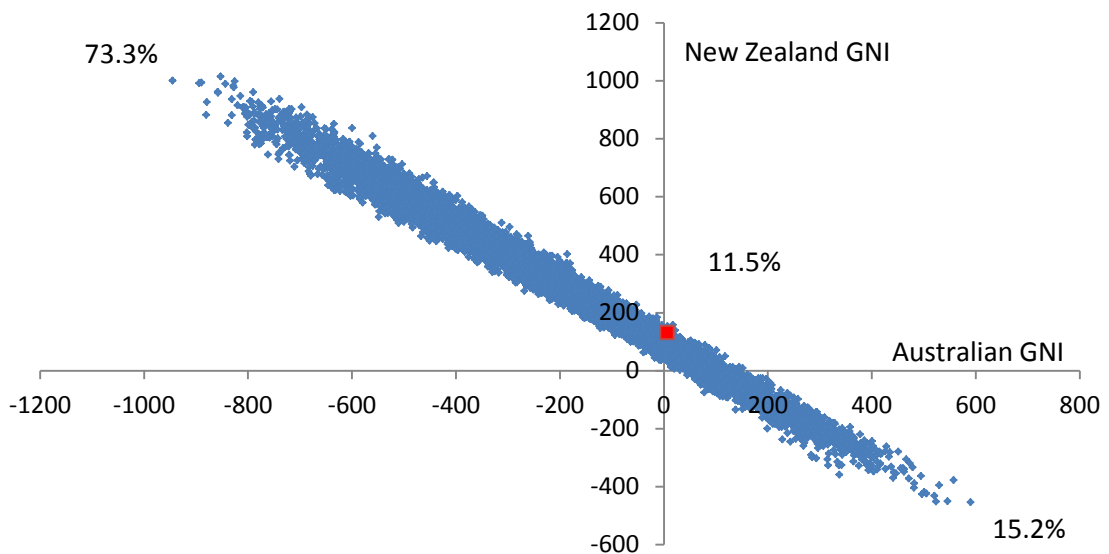
a The red data points indicate the CIE's results. CIE did not report GNI, so a GNI value was reported for an SMRIC simulation that produced results the same as those reported by CIE (GDP, consumption, capital movement).**b.** The percentages in the chart show the percentage of parameter combinations that give results in the relevant quadrants: New Zealand and Australia both expand; New Zealand expands and Australia contracts; Australia expands and New Zealand contracts.

Data source: Australian Commission estimates.

Box G.2   NZIER-CIE and SMRIC modelling results

Mutual recognition of imputation credits has the potential to impose costs and create benefits for the Australian and New Zealand economies. Economic modelling is one means of attempting to illustrate the relative magnitudes and distribution of those costs and benefits.

In the NZIER-CIE report on the costs and benefits of mutual recognition, the CIE used the computable general equilibrium (CGE) CIE-GCubed model (ANZLF sub. 58) to examine the efficiency implications of a mutual recognition policy for the ANZLF. The SMRIC model can be used to shed some light on the CIE-GCubed results.

Both modelling approaches project that MRIC would lead to small trans-Tasman efficiency gains and asymmetric credit costs for the two governments. The central result reported by the ANZLF projects small increases in GDP for both economies (which combine to give small trans-Tasman increases in GDP). Analysis using the SMRIC model indicates that this outcome requires a very particular set of parameter assumptions.

The Commission deliberately excluded tax revenue replacement schemes from its result calculations to ensure that the results abstracted from any potential efficiency effects associated with collecting tax revenue through a more efficient instrument. This would be a separate policy that could be initiated independently from MRIC. The CIE modelling included tax revenue replacement through changes in an alternative, broad-based tax.

Under a similar set of input, capital growth and tax revenue replacement assumptions, the models produce similar results. The CIE's results are included in the array of results presented in the Commission's modelling in figure G.2.

Table   **NZIER-CIE and SMRIC model results for similar assumptions**
Changes US$m, 2012

	Real GDP		Net tax revenue	
	Aust	*NZ*	*Aust*	*NZ*
NZIER-CIE results				
Net present value to 2030 (NZ$m)	2200	3100	0	0
Average annual value (NZ$m)	94	196	0	0
Average annual value (US$m)	**67**	**139**	**0**	**0**
SMRIC results				
NZIER-CIE assumptions (US$m)	**88**	**143**	**0**	**0**

Source: Australian Commission estimates; ANZLF (sub. 58); Davis (pers. comm., 2012).

G.6 Conclusions

The SMRIC model is a stylised representation of the Australian, New Zealand and Rest of the World economies, designed to examine trans-Tasman imputation credit recognition policies. It has been used to examine the allocative efficiency and welfare implications resulting from the interaction of company and personal income tax interactions with the introduction of imputation credits. The simple and flexible model structure allows the easy examination of the effects of changing parameters and input data, enabling comparison of a range of plausible values of real world parameters related to dividends; credits claimed; capital supply and demand elasticities; trans-Tasman capital stock/income/equity variation; and exogenously specified capital accumulation.

Based on the sensitivities examined in this paper, the key messages are:

1. Unilateral imputation credit recognition policies result in GDP and GNI losses for the source country and gains for the destination country.

2. An MRIC policy results in small increases in trans-Tasman GDP and GNI, brought about by improved allocation of trans-Tasman capital by removing existing price distortions.

3. The costs and benefits of mutual recognition are unlikely to be shared evenly between Australia and New Zealand. Capital back-filling can counteract GDP losses, but does not compensate for GNI reductions.

4. In 21.2 percent of parameter combinations examined, GDP increased for both economies. GNI increased for both economies in 11.5 percent of the combinations examined.

5. In 26.7 percent of parameter combinations examined, Australian GNI increases as a result of MRIC. New Zealand GNI increases in 84.8 percent of combinations.

6. The tax revenue cost is likely to be larger for Australia than New Zealand, because credits are granted on inframarginal capital, and the stock of Australian owned capital in New Zealand is larger than New Zealand owned capital in Australia. On average, 80.2 percent of the trans-Tasman revenue cost is borne by Australia.

Appendix G.1: Model structure

The SMRIC model includes three regions — Australia, New Zealand and the Rest of the World. Each region produces a unique type of output (seeking to minimise the cost of production) using four factors of production: a factor that is assumed not to relocate (aggregate labour); and three region-specific sourced factors that are internationally substitutable (capital). Capital owners substitute supply between regions based on a constant elasticity of transformation, subject to a fixed total capital supply. There are two types of firms in each country: firms that have access to global equity finance and firms that do not. Regional output is a fixed-proportion combination of the output of both firm types.

Incomes from factors less taxes on returns in the destination region (such as payroll for labour, and company tax for capital) accrue to the owners of the factors, and this income is then subject to the personal tax rate in the source region. The residual disposable income can be spent on consumption. Each region has final demands for each of the three types of output, substituting between them based on relative prices.

The remainder of this appendix documents the key variables and equations in the SMRIC model.

The following letters represent sets in the model:

1. r,s,t: region in which output is produced

2. i,j: region from which an input is sourced

3. c: region in which output is consumed

The following terms are parameters in the model:

4. $\theta l(r)$: CES parameter, share of labour in total cost in r

5. $\theta k(r)$: CES parameter, share of all capital in total cost in r

6. $\theta tt(r)$: CES parameter, share all trans-Tasman capital in total capital cost in r

7. $\theta row(r)$: CES parameter, share Rest of the World capital in total capital cost in r

8. $\theta aus(r)$: CES parameter, share Australian capital in total trans-Tasman capital cost in r

9. $\theta nzl(r)$: CES parameter, share New Zealand capital in total trans-Tasman capital cost in r

10. $\sigma_{LK}(r)$: Substitution elasticity between labour and top-level capital composite in r

11. $\sigma_{RoW}(r)$: Substitution elasticity between trans-Tasman capital composite and Rest of the World capital in r

12. $\sigma_{TT}(r)$: Substitution elasticity between Australian and New Zealand sourced capital in r

13. $\sigma_{KS}(i)$: Capital supply substitution elasticity between regions

14. $plbar(r)$: initial price of labour in r

15. $pkbar(i,r)$: initial price of capital in r sourced from i

16. $p2bar(r)$: initial price of capital composite (Rest of the World and trans-Tasman) in r

17. $p3bar(r)$: initial price of trans-Tasman capital composite (

18. $qcbar(c)$: initial level of output in c

19. $qlbar(r)$: initial labour endowment in region r

20. $qkbar(i,r)$: initial labour endowment, owned by i used in r

21. $\gamma(r) = 1 - \sigma(r)$, where $\sigma(r)$ is the elasticity of substitution between inputs in r

22. $tK(i,r)$: taxes on capital used in r sourced from i, accruing to i

23. $tL(r)$: taxes on labour used in r

24. $tY(r)$: income taxes in r

25. $tC(r,c)$: consumption taxes on r consumed in c, accruing to c

26. $\alpha(r,c)$: Cobb-Douglas consumption parameter for good r consumed in c

The following terms are variables in the model:

27. $Cost(r)$: total cost of production in region r

28. $Cost1(r)$: unit cost of input composite in region r

29. $Cost2(r)$: unit cost of capital composite in region r

30. $Cost3(r)$: unit cost of trans-Tasman capital composite in region r

31. $XRoW(r)$: demand for capital sourced from the Rest of the World used in r

32. $XAus(r)$: demand for capital sourced from Australia used in r

33. $XNzl(r)$: demand for capital sourced from New Zealand used in r

34. $PlD(r)$: wage rate (incl. tax) in region r

35. $PlS(r)$: wage rate (post tax) in region r

36. $QlD(r)$: quantity of labour demanded in region r

37. $PkD(i,r)$: rental rate of capital sourced from i used in r

38. $PkS(i,r)$: post-tax return to capital owned in i supplied to r

39. $QkD(i,r)$: demand for capital sourced from i used in r

40. $QkS(i,r)$: demand for capital sourced from i used in r

41. $PoD(r,c)$: price of output r consumed in region c

42. $PoS(r)$: price of supply in region r

43. $QoD(r,c)$: quantity of output r demanded in region c

44. $QoS(r)$: total quantity of output r

45. $Y(c)$: total incomes in region c

46. $Yd(c)$: disposable household income in region c

47. $Yg(c)$: government revenues in region c

Production side

Firms in region r minimise their cost of production (by sourcing inputs from region i) subject to a constant elasticity of substitution (CES) production function. Based on this optimisation problem, the first order conditions imply cost and input demand functions. Cost functions are nested with three levels: level 1 governs the substitutability between labour and capital; level 2 the substitutability between trans-Tasman capital and rest of the world capital; and level 3 the substitutability between Australian and New Zealand sourced capital.

$$Cost(r) = QoS(r).Cost1(r)$$

$$Cost1(r) = \left[\theta l(r) \left(\frac{PlD(r)}{plbar(r)} \right)^{1-\sigma_{LK}(r)} + \theta k(r) \left(\frac{Cost2(r)}{p2bar(r)} \right)^{1-\sigma_{LK}(r)} \right]^{\frac{1}{1-\sigma_{LK}(r)}}$$

$$Cost2(r) = \left[\theta tt(r) \left(\frac{Cost3(r)}{p3bar(r)} \right)^{1-\sigma_{RoW}(r)} \right.$$

$$\left. + \theta row(r) \left(\frac{PkD('RoW',r)}{pkbar('RoW',r)} \right)^{1-\sigma_{RoW}(r)} \right]^{\frac{1}{1-\sigma_{RoW}(r)}}$$

$$Cost3(r) = \left[\theta aus(r) \left(\frac{PkD('Aus',r)}{pkbar('Aus',r)} \right)^{1-\sigma_{TT}(r)} \right.$$

$$\left. + \theta nzl(r) \left(\frac{PkD('Nzl',r)}{pkbar('Nzl',r)} \right)^{1-\sigma_{TT}(r)} \right]^{\frac{1}{1-\sigma_{TT}(r)}}$$

$$QlD(r) = \frac{QoS(r)}{\sum_c qcbar(c)} \cdot \left(\frac{PlD(r)}{plbar(r)} \right)^{-\sigma_{LK}(r)} \times Cost1(r)^{\sigma_{LK}(r)}$$

$$XRoW(r) = \frac{QoS(r)}{\sum_c qcbar(c)} \cdot \left(\frac{PkD('RoW',r)}{pkbar('RoW',r)} \right)^{-\sigma_{RoW}(r)} \times Cost1(f,r)^{\sigma_{LK}(r)}$$
$$\times Cost2(r)^{\sigma_{RoW}(r)-\sigma_{LK}(r)}$$

$$XAus(r) = \frac{QoS(r)}{\sum_c qcbar(c)} \cdot \left(\frac{PkD('Aus',r)}{pkbar('Aus',r)} \right)^{-\sigma_{TT}(f,r)} \times Cost1(r)^{\sigma_{LK}(r)}$$
$$\times Cost2(r)^{\sigma_{RoW}(r)-\sigma_{LK}(r)} \times Cost3(r)^{\sigma_{TT}(r)-\sigma_{RoW}(r)}$$

$$XNzl(r) = \frac{QoS(r)}{\sum_c qcbar(c)} \cdot \left(\frac{PkD('Nzl',r)}{pkbar('Nzl',r)} \right)^{-\sigma_{TT}(f,r)} \times Cost1(r)^{\sigma_{LK}(r)}$$
$$\times Cost2(r)^{\sigma_{RoW}(r)-\sigma_{LK}(r)} \times Cost3(r)^{\sigma_{TT}(r)-\sigma_{RoW}(r)}$$

$$QkD(i,r) = XAus(r)|_{i=Aus} + XNzl(r)|_{i=Nzl} + XRoW(r)|_{i=RoW}$$

Factor supply prices (the post-tax return on capital, and post-tax wage) are defined as the demand prices (the rental rate of capital, and the wage) less taxes:

$$PkS(i,r) = PkD(i,r).(1 - tK(i,r))$$

$$PlS(i) = PlD(r).(1 - tL(r))$$

The supply of output is determined such that suppliers from region r meet the sum of demands from all regions C. Output is region specific. Output in each country is a fixed proportions combination of large and small firm output. The market clearing condition determines the level of output:

$$QoS(r) = \sum_c QoD(r,c)$$

Factor supply side

The market clearing conditions between the demand and supply sides for each factor determine the price.

Labour factor supplies are determined by national capacity constraints. Labour is fixed by country.

$$QlD(r) = qlbar(r)$$

Global capital supplies are governed by a constant elasticity of supply functional firm. Capital owners in each region are assumed to maximise the return to their investment by allocating a fixed capital stock globally. Changing the elasticity adjusts the preference capital owners have for particular regions. In the extreme cases, (1) capital owners decide between regions based solely on rates of return, without preference for particular regions and (2) capital owners desire a fixed portfolio share (reflecting a globally diverse portfolio) of their capital in each region. This is consistent with capital suppliers exhibiting a preference for certain countries on the basis of risk, governance, regulatory arrangements or firm sizes (consistent S&J).

$$QkD(i,r) = QkS(i,r)$$

$$QkS(i,r) = \frac{\left(\sum_s qkbar(i,s)\right)\left(\frac{kbar(i,r)}{\sum_s qkbar(i,s)}\right)\left(\frac{PkS(i,r)}{pkbar(i,r) - taxk(i,r)}\right)^{\sigma_{KS}(i)-1}}{\sum_t\left[\left(\frac{kbar(i,t)}{\sum_s qkbar(i,s)}\right)\left(\frac{PkS(i,t)}{pkbar(i,t) - taxk(i,t)}\right)^{\sigma_{KS}(i)-1}\right]}$$

Consumption side

Consumers maximise their CES utility subject to a constrained budget. For the purposes of this simplified example, consumers are treated as having a Cobb–Douglas utility function. The first order conditions imply final demands:

$$QoD(r,c) = \frac{\alpha(r,c).Y(c)}{PoD(r,c)}$$

The supply price is defined as the demand price less consumption taxes:

$$PoS(r) = PoD(r,c).(1 - tC(r,c))$$

National income is the sum of household income and government revenue, such that:

$$Y(c) = Yd(c) + Yg(c)$$

$$Yd(c) = (1 - tY(c)). \left(\sum_f PlD(c).QlD(c) \right.$$

$$\left. + \sum_r PkD(c,r).Qkd(c,r) - \sum_r tK(c,r).Pkd(c,r).Qkd(c,r) \right)$$

$$Yg(c) = \frac{tY(c)}{1 - tY(c)}.Yd(c) + \sum_{f,i} tK(i,c).Pkd(i,c).Qkd(i,c)$$

Suppliers are assumed not to make any rents, such that:

$$PoS(r).QoS(r) = Cost(r)$$

The model was specified in the GAMS software, as an MCP problem. It was solved using the MILES and PATH solvers.

Appendix G.2: Data and sources

The model has been calibrated from a range of sources. All data collected are for 2010.

- Aggregate consumption, labour income and non-corporate capital returns were obtained from Australian and New Zealand national accounts. Rest of the World values were obtained from the GTAP 7.0 database and scaled to 2010 values using the change in Australian and New Zealand values between 2004 and 2010.

- Australian exports and imports were taken from the national accounts data from the ABS. These values were then apportioned between New Zealand and Rest of the World using ABS merchandise trade data, to derive trans-Tasman trade and Australian-Rest of the World trade flows. This implicitly assumes that services trade flows mimic total merchandise trade flows. Trade flows between New Zealand and Rest of the World were derived by subtracting the previously calculated Australia-New Zealand flows from total New Zealand export and import values (obtained from Statistics New Zealand (SNZ) national accounts).

- Australian and New Zealand total corporate capital income were taken from CIE-NZIER. Total returns to trans-Tasman and ROW corporate capital were calculated using SNZ data on NZ equity investment in Australia.

- Company tax rates were obtained from the Australian Taxation Office and the New Zealand Inland Revenue Department. Rest of the World company tax rates were assumed to be 10 percent.

- Rest of the World corporate capital income was calculated by applying the share of corporate capital incomes in GDP in the ANZEA database to value of GDP.

Australian and New Zealand data were converted to 2010 US$ millions using market exchange rates.

All statistical discrepancies reported by statistical agencies were added to large aggregates; for example labour income or consumption. This means that their potential impacts on results is minimised.

Database values and sources for Australia, New Zealand and Rest of the World are presented in tables G.6, G.7 and G.8. These data were adjusted to ensure consistency with the real economy.

Table G.6   **Database values and sources, Australia**

	Database value	Database value	Sources
	2010 US$m	2010 A$m[a]	
Labour cost (including taxes), land and other capital income	1 023 366	1 149 850	ABS national accounts, ABS statistical discrepancy included
Corporate capital returns (After-tax)			
Australia owned	143 468	161 199	CIE-NZIER
New Zealand owned	2,371	2,664	CIE-NZIER
Rest of the World owned	27,073	30,419	CIE-NZIER
Corporate capital taxes levied on			
Australia owned	0	0	Assumed
New Zealand owned	711	799	ATO, CIE-NZIER
Rest of the World owned	8,122	9,126	ATO, CIE-NZIER
GDP (total)	1 205 111	1 354 057	
Australian consumption	1 191 568	1 338 840	ABS national accounts, ABS statistical discrepancy included
Exports to New Zealand	8 762	9 845	ABS national accounts, ABS merchandise trade (by country)
Exports to ROW	244 185	274 365	ABS national accounts, ABS merchandise trade (by country)
Imports from New Zealand	8 209	9 224	ABS national accounts, ABS merchandise trade (by country)
Imports from ROW	231 195	259 770	ABS national accounts, ABS merchandise trade (by country)
GDP (total)	1 205 111	1 354 057	

[a] One 2010 A$ is equal to 0.89 2010 US$.

Source: Australian Commission estimates.

Table G.7   Database values and sources, New Zealand

	Database value	Database value	Sources
	2010 US$m	2010 NZ$m[a]	
Labour cost (including taxes), land and other capital income	113 743	160 202	SNZ national accounts
Corporate capital returns (After-tax)			
New Zealand owned	12 411	17 481	CIE-NZIER
Australia owned	3 274	4 612	CIE-NZIER
Rest of the World owned	2 339	3 294	CIE-NZIER
Corporate capital taxes levied on			
New Zealand owned	0	0	Assumed
Australia owned	917	1,291	New Zealand IRD tax data, CIE-NZIER
Rest of the World owned	655	922	New Zealand IRD tax data, CIE-NZIER
GDP	133 339	187 801	
New Zealand consumption	131 398	185 068	SNZ national accounts, SNZ statistical discrepancy included
Exports to Australia	8 209	11 562	ABS national accounts ABS merchandise trade (by country) data
Exports to ROW	29 012	40 862	SNZ national accounts, remainder after exports to Australia subtracted
Imports from Australia	8 762	12 341	ABS national accounts, ABS merchandise trade (by country) data
Imports from ROW	26 518	37 349	SNZ national accounts, remainder after imports to Australia subtracted
GDP	133 339	187 801	

a One 2010 NZ$ is equal to 0.71 2010 US$.

Source: Australian Commission estimates.

Table G.8   Database values and sources, Rest of the World

	Database value	Sources
	2010 US$m	
Labour cost (including taxes), land and other capital income	66 103 272	ANZEA database, ROW GDP (expenditure side)
Corporate capital returns (After-tax)		
Rest of the World owned	10 595 672	ABS national accounts
Australia owned	15 073	ABS national accounts, ABS international investment position data
New Zealand owned	906	ABS national accounts, ABS international investment position data
Corporate capital taxes levied on		
Rest of the World owned	0	ABS national accounts
Australia owned	1 507	ABS national accounts, ABS international investment position data
New Zealand owned	91	ABS national accounts ABS international investment position data
GDP	76 716 520	
Rest of the World consumption	76 732 004	ANZEA database, ABS and SNZ national accounts
Exports to Australia	231 195	ABS national accounts ABS merchandise trade (by country) data
Exports to New Zealand	26 518	SNZ national accounts, remainder after exports to Australia subtracted
Imports from Australia	244 185	ABS national accounts, ABS merchandise trade (by country) data
Imports from New Zealand	29 012	SNZ national accounts, remainder after imports to Australia subtracted
GDP	76 716 520	

Source: Australian Commission estimates.

Appendix G.3: Detailed model results

Australian recognition of New Zealand imputation credits

Table G.9   **Disaggregated impacts on gross national income and expenditure[a]**

Change US$m, 2012

	Trans-Tasman	Australia	New Zealand	Rest of the World
Labour and land income accruing to households after tax[b]	33	-72	105	-2
Returns to domestically owned and used capital accruing to households after tax	32	-42	74	21
Imputation credits granted for foreign capital taxes	263	263	0	0
Returns to domestically owned capital used overseas accruing to households after tax	-33	-32	0	-23
used in Australia	1	na	1	33
used in New Zealand	-19	-19	na	-56
used in the Rest of the World	-14	-13	-1	0
Taxes on personal income	-264	-353	88	-2
Total tax collected on personal income	-32	-120	88	-2
credits granted for domestic company tax	31	31	0	0
credits granted for foreign company tax	-263	-263	0	0
Company taxes levied on capital used domestically	-1	-18	17	-3
Australian owned	9	-31	40	-2
New Zealand owned	-3	-3	0	-1
Rest of the World owned	-8	16	-23	0
Gross National Income	*30*	*-254*	*284*	*-8*
Consumption of domestic production	8	-207	216	-8
Consumption of imports	22	-46	68	0
from Australia	17	0	17	0
from New Zealand	-2	-2	0	0
from the Rest of the World	7	-45	51	0
Gross National Expenditure	*30*	*-254*	*284*	*-8*

a The elasticity of substitution between labour and capital and the elasticity of substitution between capital from different sources are both set to 0.85. **b** Region-specific inputs are assumed to be in fixed supply.

Source: Australian Commission estimates.

Table G.10 **Disaggregated impacts on the trade balance and total factor payments**[a]

Change US$m, 2012

	Trans-Tasman	Australia	New Zealand	Rest of the World
Exports	**16**	**68**	**-52**	**5**
to Australia	-13	0	-13	-81
to New Zealand	30	30	0	87
to the Rest of the World	-1	38	-39	0
Imports	**22**	**-46**	**68**	**0**
from Australia	17	0	17	0
from New Zealand	-2	-2	0	0
from the Rest of the World	7	-45	51	0
Trade balance	***-6***	***115***	***-120***	***5***
Capital income received from o/seas including foreign taxes	**-24**	**-19**	**-5**	**-41**
from Australia	-3	0	-3	62
from New Zealand	7	7	0	-103
from the Rest of the World	-29	-27	-2	0
Capital income paid to o/seas owners including domestic taxes	**-36**	**69**	**-104**	**-30**
to Australia	2	0	2	-29
to New Zealand	1	1	0	-1
to the Rest of the World	-38	68	-106	0
Company tax collected from foreign-owned capital incomes earned domestically	**30**	**13**	**17**	**-3**
Australian owned	40	0	40	-2
New Zealand owned	-3	-3	0	-1
Rest of the World owned	-8	16	-23	0
Company tax paid from domestically owned capital incomes earned overseas	**35**	**40**	**-4**	**-8**
in Australia	-4	0	-4	14
in New Zealand	42	42	0	-22
in the Rest of the World	-3	-2	-1	0
Total factor payments	***6***	***-115***	***120***	***-5***

a The elasticity of substitution between labour and capital and the elasticity of substitution between capital from different sources are both set to 0.85. **b** Region-specific inputs are assumed to be in fixed supply.

Source: Australian Commission estimates.

Table G.11   **Impacts on gross domestic product from the expenditure and income sides[a]**

Change US$m, 2012

	Trans-Tasman	Australia	New Zealand	Rest of the World
Consumption, Investment, Government spending	**30**	**-254**	**284**	**-8**
Exports	**16**	**68**	**-52**	**5**
Imports	**22**	**-46**	**68**	**0**
GDP (Expenditure side)	*24*	*-139*	*163*	*-3*
Specific factor income (including taxes)	**26**	**-132**	**157**	**-3**
Capital income (including taxes)	**-2**	**-8**	**6**	**0**
Australian owned	-74	-76	2	-29
New Zealand owned	111	1	110	-1
Rest of the World owned	-38	68	-106	30
GDP (Income side)	*24*	*-139*	*163*	*-3*

a The elasticity of substitution between labour and capital and the elasticity of substitution between capital from different sources are both set to 0.85. **b** Region-specific inputs are assumed to be in fixed supply.

Source: Australian Commission estimates.

New Zealand recognition of Australian imputation credits

Table G.12   **Disaggregated impacts on gross national income and expenditure[a]**
Change US$m, 2012

	Trans-Tasman	Australia	New Zealand	Rest of the World
Labour and land income accruing to households after tax[b]	**-3**	**56**	**-60**	**0**
Returns to domestically owned and used capital accruing to households after tax	**30**	**58**	**-28**	**15**
Imputation credits granted for foreign capital taxes	**171**	**0**	**171**	**0**
Returns to domestically owned capital used overseas accruing to households after tax	**-49**	**-20**	**-30**	**-15**
used in Australia	-30	na	-30	-42
used in New Zealand	-8	-8	na	28
used in the Rest of the World	-11	-11	0	0
Taxes on personal income	**-134**	**72**	**-207**	**0**
Total tax collected on personal income	19	77	-58	0
credits granted for domestic company tax	17	-5	22	0
credits granted for foreign company tax	-171	0	-171	0
Company taxes levied on capital used domestically	**1**	**13**	**-13**	**-2**
Australian owned	2	5	-2	-2
New Zealand owned	6	28	-22	0
Rest of the World owned	-7	-19	12	0
Gross National Income	*14*	*180*	*-166*	*-2*
Consumption of domestic production	**21**	**147**	**-126**	**-2**
Consumption of imports	**-7**	**33**	**-40**	**0**
from Australia	-10	0	-10	0
from New Zealand	1	1	0	0
from the Rest of the World	2	32	-30	0
Gross National Expenditure	*14*	*180*	*-166*	*-2*

a The elasticity of substitution between labour and capital and the elasticity of substitution between capital from different sources are both set to 0.85. **b** Region-specific inputs are assumed to be in fixed supply.

Source: Australian Commission estimates.

Table G.13 **Disaggregated impacts on the trade balance and total factor payments[a]**
Change US$m, 2012

	Trans-Tasman	Australia	New Zealand	Rest of the World
Exports	**-8**	**-41**	**33**	**2**
to Australia	8	0	8	54
to New Zealand	-18	-18	0	-52
to the Rest of the World	2	-23	25	0
Imports	**-7**	**33**	**-40**	**0**
from Australia	-10	0	-10	0
from New Zealand	1	1	0	0
from the Rest of the World	2	32	-30	0
Trade balance	*-1*	*-74*	*73*	*2*
Capital income received from o/seas including foreign taxes	**-57**	**-41**	**-16**	**-28**
from Australia	-17	0	-17	-78
from New Zealand	-19	-19	0	50
from the Rest of the World	-22	-22	0	0
Capital income paid to o/seas owners including domestic taxes	**-63**	**-101**	**38**	**-21**
to Australia	-15	0	-15	-21
to New Zealand	-19	-19	0	-1
to the Rest of the World	-29	-82	53	0
Company tax collected from foreign-owned capital incomes earned domestically	**18**	**9**	**9**	**-2**
Australian owned	-2	0	-2	-2
New Zealand owned	28	28	0	0
Rest of the World owned	-7	-19	12	0
Company tax paid from domestically owned capital incomes earned overseas	**22**	**-5**	**28**	**-7**
in Australia	28	0	28	-18
in New Zealand	-3	-3	0	11
in the Rest of the World	-2	-2	0	0
Total factor payments	*1*	*74*	*-73*	*-2*

a The elasticity of substitution between labour and capital and the elasticity of substitution between capital from different sources are both set to 0.85. **b** Region-specific inputs are assumed to be in fixed supply.

Source: Australian Commission estimates.

Table G.14   **Impacts on gross domestic product from the expenditure and income sides**[a]

Change US$m, 2012

	Trans-Tasman	Australia	New Zealand	Rest of the World
Consumption, Investment, Government spending	14	180	-166	-2
Exports	-8	-41	33	2
Imports	-7	33	-40	0
GDP (Expenditure side)	*13*	*106*	*-93*	*0*
Specific factor income (including taxes)	13	102	-89	-1
Capital income (including taxes)	0	4	-4	0
Australian owned	90	105	-15	-21
New Zealand owned	-61	-19	-42	-1
Rest of the World owned	-29	-82	53	22
GDP (Income side)	*13*	*106*	*-93*	*0*

a The elasticity of substitution between labour and capital and the elasticity of substitution between capital from different sources are both set to 0.85. **b** Region-specific inputs are assumed to be in fixed supply.

Source: Australian Commission estimates.

Mutual recognition of trans-Tasman imputation credits

Table G.15 **Disaggregated impacts on gross national income and expenditure[a]**

Change US$m, 2012

	Trans-Tasman	Australia	New Zealand	Rest of the World
Labour and land income accruing to households after tax[b]	30	-16	46	-2
Returns to domestically owned and used capital accruing to households after tax	62	15	46	36
Imputation credits granted for foreign capital taxes	432	262	170	0
Returns to domestically owned capital used overseas accruing to households after tax	-81	-52	-30	-38
used in Australia	-29	na	-29	-8
used in New Zealand	-27	-27	na	-29
used in the Rest of the World	-25	-25	-1	0
Taxes on personal income	-396	-279	-117	-2
Total tax collected on personal income	-12	-43	31	-2
credits granted for domestic company tax	47	26	21	0
credits granted for foreign company tax	-432	-262	-170	0
Company taxes levied on capital used domestically	0	-5	4	-5
Australian owned	12	-26	38	-4
New Zealand owned	3	24	-21	-1
Rest of the World owned	-15	-3	-12	0
Gross National Income	*46*	*-74*	*120*	*-11*
Consumption of domestic production	30	-61	91	-11
Consumption of imports	15	-14	29	0
from Australia	7	0	7	0
from New Zealand	0	0	0	0
from the Rest of the World	9	-13	22	0
Gross National Expenditure	*46*	*-74*	*120*	*-11*

a The elasticity of substitution between labour and capital and the elasticity of substitution between capital from different sources are both set to 0.85. **b** Region-specific inputs are assumed to be in fixed supply.

Source: Australian Commission estimates.

Table G.16 **Disaggregated impacts on the trade balance and total factor payments[a]**

Change US$m, 2012

	Trans-Tasman	Australia	New Zealand	Rest of the World
Exports	**8**	**28**	**-20**	**7**
to Australia	-5	0	-5	-28
to New Zealand	12	12	0	35
to the Rest of the World	0	15	-15	0
Imports	**15**	**-14**	**29**	**0**
from Australia	7	0	7	0
from New Zealand	0	0	0	0
from the Rest of the World	9	-13	22	0
Trade balance	*-8*	*41*	*-49*	*7*
Capital income received from o/seas including foreign taxes	**-81**	**-60**	**-21**	**-69**
from Australia	-19	0	-19	-16
from New Zealand	-11	-11	0	-53
from the Rest of the World	-51	-49	-2	0
Capital income paid to o/seas owners including domestic taxes	**-99**	**-32**	**-67**	**-51**
to Australia	-13	0	-13	-50
to New Zealand	-18	-18	0	-2
to the Rest of the World	-68	-13	-54	0
Company tax collected from foreign-owned capital incomes earned domestically	**47**	**21**	**26**	**-5**
Australian owned	38	0	38	-4
New Zealand owned	24	24	0	-1
Rest of the World owned	-15	-3	-12	0
Company tax paid from domestically owned capital incomes earned overseas	**57**	**34**	**23**	**-15**
in Australia	24	0	24	-4
in New Zealand	39	39	0	-12
in the Rest of the World	-5	-4	-1	0
Total factor payments	*8*	*-41*	*49*	*-7*

a The elasticity of substitution between labour and capital and the elasticity of substitution between capital from different sources are both set to 0.85. **b** Region-specific inputs are assumed to be in fixed supply.

Source: Australian Commission estimates.

Table G.17   **Impacts on gross domestic product from the expenditure and income sides[a]**

Change US$m, 2012

	Trans-Tasman	Australia	New Zealand	Rest of the World
Consumption, Investment, Government spending	**46**	**-74**	**120**	**-11**
Exports	**8**	**28**	**-20**	**7**
Imports	**15**	**-14**	**29**	**0**
GDP (Expenditure side)	*38*	*-33*	*71*	*-3*
Specific factor income (including taxes)	**39**	**-30**	**69**	**-3**
Capital income (including taxes)	**-1**	**-3**	**2**	**0**
Australian owned	15	28	-13	-50
New Zealand owned	51	-18	69	-2
Rest of the World owned	-68	-13	-54	51
GDP (Income side)	*38*	*-33*	*71*	*-3*

a The elasticity of substitution between labour and capital and the elasticity of substitution between capital from different sources are both set to 0.85. **b** Region-specific inputs are assumed to be in fixed supply.

Source: Australian Commission estimates.

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